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10/814,965	03/31/2004	Clifford Earl Shamblen	129955/11854 (21635-0122)	8707

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EXAMINER	
MCNELIS, KATHLEEN A	
ART UNIT	**PAPER NUMBER**
1742	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/814,965	SHAMBLEN ET AL.	
	Examiner	Art Unit	
	Kathleen A. McNelis	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-25 and 27-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-25 and 27-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claims Status

Claims 1, 3-25 and 27-29 remain for examination wherein claims 1, 17, 20 and 23 are amended and claims 27-29 are new.

Status of Previous Rejections

The following rejections are withdrawn in view of amendments to and cancellation of claims:

- Claim 1-3, 5-7, 11, 13, 15 and 18 under 35 U.S.C. 102(b) as anticipated Baum (U.S. Pat. No. 3,918,956),
- Claims 1-3, 5-7, 11 and 13 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nagata et al. (U.S. PG Pub. No. 2002/0005089),
- Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as unpatentable over the ASM Handbook, Volume 7 (1998),
- Claims 1-3, 5-7 and 11 under 35 U.S.C. 103(a) as unpatentable over Kundrat (U.S. Pat. No. 5,567,224), and
- Claims 10, 15, 16, 18-20 and 26 under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (U.S. PG Pub. No. 2002/0005089) or Kundrat (U.S. Pat. No. 5,567,224) as applied to claim 1 and further in view of Peras (U.S. Pat. No. 3,234,608),
- Claim 1-4, 14, 17, 20, 21 and 23 under 35 U.S.C. 103(a) as being unpatentable over Ellis et al. (U.S. Pat. No. 3,886,637) in view of the ASM Handbook, Vol. 7 and de Waal et al. (U.S. Pat. No. 4,606,761) or Altenhoner et al. (U.S. Pat. No. 4,040,816).

The following rejections are maintained:

- Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (U.S. PG Pub. No. 2002/0005089) or Kundrat (U.S. Pat. No. 5,567,224) as applied to claim 1 and further in view of Peras (U.S. Pat. No. 3,234,608),

DETAILED ACTION

Claim Objections

Claims 3 and 6 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 1 recites nickel-base or cobalt-base or iron base or iron-nickel base or iron-nickel-cobalt base superalloys or martensitic steel, which are respectively nickel-base or cobalt-base or iron base or iron-nickel base or iron-nickel-cobalt base or iron-base alloys, therefore since claim 3 recites the same compositions in broader terms, it does not further limit claim 1.

Claim 1 recites furnishing a mixture of at least two nonmetallic precursor compounds, whereas claim 6 recite furnishing a mixture of at least two different nonmetallic precursor compounds. Unless the two compounds recited in claim 1 can be the same compound, claim 6 does not further limit claim 1.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The amendments to claim 1 require the addition of at least one alloying element to the initial mixture (lines 3-7). Claim 13 requires that no such alloying element be added. Claim 13 appears to contradict the amended limitation of claim 1.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (U.S. PG Pub. No. 2002/0005089) or Kundrat (U.S. Pat. No. 5,567,224) as applied to claim 1 and further in view of Peras (U.S. Pat. No. 3,234,608).

Nagata et al. or Kundrat in view of Peras is applied as set forth in the 11/15/2006 Office action.

Claims 1, 3, 5-7, 11, 13, 14, 15, 17-19, 24 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grant et al. (U.S. Pat. No. 3,000,734) in view of applicant's admitted prior art (paragraphs 0002-0004 of the instant specification).

With respect to claims 1, 3, 6, 13, 15, 18, 19, 24 and 27-29, Grant et al. discloses a method for producing heat resistant alloys of the superalloy type based on iron, nickel and/or cobalt (col. 3 lines 6-16). In an example, a Ni-Cr-Fe alloy is produced by mixing powder of Ni, Cr and Al with powder of Fe_2O_3 and heated to a temperature of about 1200 °C for a time just sufficient to minimize diffusion reactions between ingredients as much as possible. The mixture is subsequently treated at about 1100 °C for about 24 hours to promote reaction between Al and Fe_2O_3, producing Al_2O_3 and Fe, where the Fe thereafter diffuses into the Ni-Cr alloy matrix and the Al_2O_3 forms a hard phase dispersed in the matrix (col. 5 lines 23-68). In a further example, Grant et al. discloses that it is also beneficial to introduce slip inhibiting phases in the Ni-Cr alloys

by the addition of Ti and Si_3N_4, where the Ti and Si_3N_4 react forming TiN and the small amount of Si is alloyed with the free Ni and Cr (col. 6 lines 16-56). In these examples, Fe_2O_3 and Si_3N_4 are nonmetallic precursor compounds, which comprise the constituents of the metallic article. These precursor compounds are chemically reduced (to Fe and Si) without melting. Grant et al. discloses putting the material through various shaping treatments such as hot die forging to produce complicated turbine blade shapes (col. 5 lines 62-68), such as those used for thermal engines (col. 1 lines 16-25) and post processing heat treatment (col. 5 lines 62-68).

Although Grant et al. does not disclose subsequent melting to produce a cast ingot and processing to produce a metallic article, the instant specification (paragraphs 0002-0004) teaches that it is typical to produce turbine components by casting, forming billets then forging to the desired shape. The use of such methods to form turbine blades would therefore have been obvious to one of ordinary skill in the art at the time the invention was made, producing no more than the expected results.

With respect to claims 5, 11, 14 and 17, Grant et al. further discloses the addition of carbon and Ti to form TiC (col. 6 lines 17-56). Although the sequence is not specified in Grant et al., the selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, C).

With respect to claim 7, the Fe_2O_3 and Si_3N_4 are reduced to Fe and Si in the solid state.

Claim Rejections - 35 USC § 103

Claims 1, 3-6, 9, 11-15, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958).

With respect to claims 1, 3, 4 and 6, Kuehmann et al. discloses a method for forming Ni-Co lath martensite matrix steel with carbides of Cr, Mo and V (col. 2 lines 14-38). In an example, high purity starting materials are used to prepare an ingot of the steel (col. 9 line 40 – col. 10 line 19).

Kuehmann et al. does not disclose furnishing a mixture of at least two nonmetallic precursor compounds and chemically reducing the mixture without melting to form metallic particles.

Talmage discloses a method of producing high purity steel by powder metallurgy (col. 1 lines 10-16) and teaches that it is beneficial to use metal oxide powders as alloy additives since it is relatively easy to obtain high purity oxides (col. 5 lines 37-45). Talmage discloses the use of dry hydrogen as a reductant and oxides of Ni, Mo, W and Cu as suitable metal oxides (col. 5 lines 64-71) with substantially no melting of the metal (col. 4 lines 14-15). Talmage further discloses blending when more than one oxide or similar additive is used (col. 6 lines 34-45). It would have been obvious to one of ordinary skill n the art at the time the invention was made to use and reduce oxides of nickel and molybdenum as taught by Talmage in the steel composition of Kuehmann et al. to provide high purity starting material as taught by Talmage and desired in Kuehmann et al.

With respect to claim 5, other additive constituents disclosed by Kuehmann et al. are Co, Cr and V as discussed above.

With respect to claim 9, dry hydrogen is a gas, therefore the reduction may be considered vapor phase.

With respect to claim 11, Kuehmann et al. discloses carbon (abstract).

With respect to claim 12, Talmage teaches that the time is sufficient to achieve the desired degree of weight loss (col. 1 lines 20-30), therefore time is a result effective variable depending on the desired conversion of oxide and subject to optimization by one of ordinary skill in the art (see M.P.E.P 2144.05, II, B).

With respect to claims 13 and 14, Kuehmann et al. discloses Co, Cr and V as additional additives, bud does not address the adding sequence. However, the selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, C).

With respect to claim 15, Kuehmann et al. discloses producing an ingot as discussed above, which is a cast article.

With respect to claims 22 and 23, Kuehmann et al. discloses solution heat treatment (i.e. heating above a required temperature), aging and quenching (i.e. cooling) col. 2 lines 23-37 and col. 9 lines 40-55).

Claims 10, 16, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958) as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608).

Kuehmann et al. in view of Talmage is applied as set forth above regarding claim 1.

Kuehmann et al. in view of Talmage does not disclose the addition of liquid alkali metal or alkaline earth metal as in claim 10, melting and solidifying without contacting a ceramic material as in claim 16 or subsequently working the ingot into a billet as in claim 24.

Peras discloses a method of continuous casting direct reduced iron ores as consumable electrodes to remove contaminates including FeO resulting from incomplete reactions in the reduction processes, producing marketable forms such as billets (col. 1 line 1 – col. 2 line 17).

Peras discloses the addition of liquid material for the formation of slag which assists in the reduction of FeO (col. 2 lines 56-72) as taught by the equation FeO + Ca = CaO + Fe (col. 5 lines 1-5). These materials are selected from calcium oxide or fluorspar (i.e. CaF_2) where Ca is an alkaline earth metal or sodium fluoride or silicate where Na is an alkali metal (col. 3 lines 1-17). Peras discloses melting in a water-cooled copper casting mold (col. 8 lines 6-14), therefore the melt does not contact a ceramic material. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the steel production method of Peras to melt the reduced iron and iron/nickel intermediate products of Kuehmann et al. in view of Talmage to remove contaminates and producing marketable billets as taught by Peras.

With respect to claim 27, Kuehman et al. discloses martensitic steel as discussed above regarding claim 1.

Claims 1, 3-6, 8, 10, 11, 13-15, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339).

With respect to claims 1, 3, 4, 6 and 8, Kuehmann et al. discloses a method for forming Ni-Co lath martensite matrix steel with carbides of Cr, Mo and V (col. 2 lines 14-38). In an example, high purity starting materials are used to prepare an ingot of the steel (col. 9 line 40 – col. 10 line 19).

Kuehmann et al. does not disclose furnishing a mixture of at least two nonmetallic precursor compounds and chemically reducing the mixture without melting to form metallic particles.

Bienvenu et al. discloses a method for production of metal powders by reduction of metal salts in a fused bath (abstract) where the metal produced can be pure metal, mixtures of metals or

an alloy (col. 1 lines 62-68) where the reduced metal can be Ni, Fe, Cr and Mo (col. 3 lines 8-10). The metals are produced from metal halides (col. 3 lines 1-10) reduced by a reducing metal, preferably calcium (col. 2 lines 6-21). The resulting metal is high purity (col. 5 lines 28-41).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to produce metals by fused salt hydrolysis as taught by Bienvenu et al. for the process of Kuehmann et al. since this method produces high purity Ni, Fe and Mo which are desired in Kuehmann et al.

With respect to claim 5, other additive constituents disclosed by Kuehmann et al. are Co, Cr and V as discussed above.

With respect to claim 10, Bienvenu et al. discloses a mixture of Mg/Ca chlorides (col. 3 lines 21-34).

With respect to claim 11, Kuehmann et al. discloses carbon (abstract).

With respect to claims 13 and 14, Kuehmann et al. discloses Co, Cr and V as additional additives, bud does not address the adding sequence. However, the selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, C).

With respect to claim 15, Kuehmann et al. discloses producing an ingot as discussed above, which is a cast article.

With respect to claims 22 and 23, Kuehmann et al. discloses solution heat treatment (i.e. heating above a required temperature), aging and quenching (i.e. cooling) col. 2 lines 23-37 and col. 9 lines 40-55).

Claims 10, 16, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339) as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608).

Kuehmann et al. in view of Bienvenu et al. is applied as set forth above regarding claim 1.

Kuehmann et al. in view of Bienvenu et al. does not disclose the addition of liquid alkali metal or alkaline earth metal as in claim 10, melting and solidifying without contacting a ceramic material as in claim 16 or subsequently working the ingot into a billet as in claim 24.

Peras discloses a method of continuous casting direct reduced iron ores as consumable electrodes to remove contaminates including FeO resulting from incomplete reactions in the reduction processes, producing marketable forms such as billets (col. 1 line 1 – col. 2 line 17). Peras discloses the addition of liquid material for the formation of slag which assists in the reduction of FeO (col. 2 lines 56-72) as taught by the equation FeO + Ca = CaO + Fe (col. 5 lines 1-5). These materials are selected from calcium oxide or fluorspar (i.e. CaF_2) where Ca is an alkaline earth metal or sodium fluoride or silicate where Na is an alkali metal (col. 3 lines 1-17). Peras discloses melting in a water-cooled copper casting mold (col. 8 lines 6-14), therefore the melt does not contact a ceramic material. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the steel production method of Peras to melt the reduced iron and iron/nickel intermediate products of Kuehmann et al. in view of Bienvenu et al. to remove contaminates and producing marketable billets as taught by Peras.

With respect to claim 27, Kuehman et al. discloses martensitic steel as discussed above regarding claim 1.

Response to Arguments

Applicant's arguments with respect to withdrawn rejections grounds have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed 12/31/2006 regarding maintained rejection grounds have been fully considered but they are not persuasive.

Arguments are summarized as follows:

With respect to the rejection of Claims 24 and 25 under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. or Kundrat as applied to claim 1 and further in view of Peras, applicant argues:

1. That there is no teaching in Nagata or Kundrat that contaminants must be removed, therefore a person of ordinary skill would not look to a secondary process for removing contaminants or producing marketable billets. Further, applicant requests that examiner list only the objective basis in each reference.
1. Applicant desires more discussion regarding the expectation of success in combining Nagata et al. or Kundrat with Peras.
2. Neither Nagata nor Kundrat teaches melting and solidifying to produce a cast ingot and converting the cast ingot into a billet.

Examiner's responses are as follows:

1. Nagata et al. discloses a method for manufacturing iron at high purity Fe (abstract), reducing iron oxides by 90% or more (paragraph 0011), removal of slag inclusion (paragraph 0019) and separation of gangue elements in ore and carbon materials (paragraphs 0005 and 0037). Therefore contaminant removal is desired in Nagata. Kundrat discloses reduction of metal oxides (col. 1 lines 9-17) and production of inexpensive Cr and Ni from reduction of metal oxides and sulfides (col. 3 lines 15-18) by partial reduction followed by refining (col. 7 lines 26-47 and examples 3 and 4).

Since the purpose of refining is understood in the art to mean the purification of crude or impure metals (see definition of "refining" from Metals Handbook), removal of contaminants is desired in Kundrat. Nagata et al. discloses manufacturing of high purity metallic iron (paragraph 0002) and Kundrat discloses production of inexpensive metal units for making alloyed iron or steel (col. 2 lines 61-65). Production of billets is an example of a marketable forms that can be produced from such as recited on page 7 of the 11/15/2006 Office action and as evidenced by Peras.

2. As stated in the 11/15/2006 Office action, Nagata et al. discloses a method for manufacturing high purity Fe by reduction of iron oxide (pp. 3-5 of 11/15/2006 Office action) and Kundrat discloses a method for reducing and refining metal oxides (p. 5-6 of 11/15/2006 Office action). Peras discloses methods of using such to produce marketable products (p. 7 of 11/15/2006 Office action).
3. As stated on p. 3 of the 11/15/2006 Office action, Nagata et al. discloses melting. The issue of subsequent solidification is addressed on p. 4 of the 11/15/2006 Office action regarding Nagata. Melting and solidification in Kundrat is addressed on pp. 5-6 of the 11/15/2006 Office action. Production by continuous casting and forming billets is addressed on p. 7 of the 11/15/2006 Office action.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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